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Reg No.:_____ Name:_____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

B.Tech Degree S3 (S, FE) / S3 (PT) (S, FE) Examination December 2023 (2015 Scheme)

Course Code: ME210

Course Name: METALLURGYAND MATERIALS ENGINEERING (MC)

Max. Marks: 100 Duration: 3 Hours

PART A

Answer any three questions, each carries 10 marks.

			Marks
1	a)	How does deformation by slip differ from deformation by twinning? Explain with neat sketches.	(7)
	b)	How does short-range order differ from long-range order in polycrystalline materials?	(3)
2		Estimate effective number of atoms, co-ordination number and atomic packing factor for an HCP structure.	(10)
3	a)	With a neat sketch explain different stages involved in crystallization/ solidification process.	(7)
	b)	Differentiate between homogenous and heterogeneous nucleation?	(3)
4		Describe with neat sketches various imperfections found in crystalline materials.	(10)

PART B

Answer any three questions, each carries 10 marks.

5		Describe the following	(5)
	a)	Austempering process	
	b)	Martempering process	(5)
6		With a neat sketch explain various phases in Iron- Iron Carbide (Fe-Fe_3C) binary phase diagram.	(10)
7		Explain with sketches recovery, recrystallization and grain growth in materials.	(10)
8		Discuss the effects of various alloying elements on steel.	(10)

PART C

Answer any four questions, each carries 10 marks.

9	a)	Describe the Mechanism and structural features of fatigue failure.	(7)
	b)	List various methods of protection against fatigue fracture.	(3)
10		Discuss Griffith theory of brittle fracture.	(10)
11		Explain with neat sketches the fatigue curve for a ferrous and a nonferrous material.	(10)

12		With a suitable sketch, explain the various stages and mechanisms involved in creep deformation.	(10)
13		Explain in detail	(5)
	a)	Ceramic matrix composites	
	b)	Metal matrix composites	(5)
14		Discuss properties and applications of maraging steel, super alloys, smart materials and bio materials?	(10)

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